

**Summary of Results of Air Monitoring in Alton, Rhode Island
May 13 – November 8, 2004**

In response to neighborhood concerns, the Rhode Island Department of Environmental Management (RI DEM) conducted air quality monitoring in the neighborhood adjacent to the Charbert facility, a Division of NFA Corporation in Alton, Rhode Island, from May to November 2004. Two types of air monitoring were conducted during that period:

- ◆ hydrogen sulfide was measured using Zellweger Analytics SPM continuous monitors and
- ◆ air samples were collected periodically and analyzed for volatile organic compounds (VOCs) and, in one case, aldehyde compounds, using EPA methods TO-15 and TO-11a, respectively.

A summary of the results of the sampling conducted follows.

Hydrogen Sulfide

Due to concern about emissions of hydrogen sulfide from the lagoons on the Charbert property, RI DEM operated continuous hydrogen sulfide monitors in the neighborhood north of the lagoons from May 13, 2004 through November 8, 2004. The locations of the monitors and dates of operation at each site are listed in Table I.

Table I –Hydrogen Sulfide Monitor Locations and Dates of Operation

Location	Dates of Operation
10 Woodville-Alton Road	5/13/04 – 7/15/04
16 River Street	6/7/04 – 7/12/04 and 7/16/04 – 8/12/04
7 Myrtle Street	8/12/04 – 10/8/04 and 10/15/04 – 11/8/04

The River Street and Myrtle Street sites were located 0.3 and 0.2 miles, respectively, north of the active Charbert lagoon, while the Woodville-Alton Road location was approximately 0.7 miles northwest of the lagoon. A graph showing the maximum daily hydrogen sulfide levels measured at the two closer sites, the River Street and Myrtle Street locations, from June 7 – November 8, 2004 is attached as Figure I.

During June and July, hydrogen sulfide levels at the River Street monitor were frequently elevated, particularly when calm wind conditions were present during the late night and early morning hours. On four occasions in those months, the monitor recorded a

hydrogen sulfide level of 90 ppb; since the monitor could not at that time record concentrations above 90 ppb, the actual concentration at those times may have been higher. The highest one-hour average concentration recorded by the River Street monitor during June and July was 86 ppb and the maximum 24-hour average concentration was 16 ppb.

The elevated concentrations measured at the River Street monitor in June and July are in the range classified by the Rhode Island Department of Health (HEALTH) as nuisance levels. Concentrations in that range cause a noticeable rotten egg type odor. People exposed to those levels may experience nausea and stress from the odors, as well as an increase in non-specific symptoms. Hypersensitive individuals may experience an exacerbation of chronic respiratory symptoms.

The hydrogen sulfide concentration at the River Street monitor on July 21, 2004 remained at 90 ppb, the maximum level that could be recorded by the equipment, for a 30-minute period, resulting in a one-hour average concentration of 86 ppb. If the average concentration during that 30-minute period was actually 118 ppb or higher, the one-hour concentration would have been 100 ppb, which is the lower end of HEALTH's moderate air quality classification range. HEALTH warns that exposures in that range may cause nuisance effects and irritation in the general population and the risk of the exacerbation of chronic respiratory disease symptoms. After that occurrence, a second monitor, configured to measure concentrations in the 60 – 1400 ppb range, was installed adjacent to the first River Street monitor so that levels above 90 ppb could be measured accurately.

Hydrogen sulfide levels at the Woodville-Alton Road location, which is farther from the lagoons, were somewhat lower than those at the River Street location. The highest level recorded at that location was 39 ppb, the highest one-hour average 28 ppb and the highest 24-hour average was 3 ppb. Although the concentrations at that location were lower than at the closer site, the levels at the Woodville-Alton location frequently reached HEALTH's nuisance range; this demonstrates that the elevated levels impacted a substantial area.

Hydrogen sulfide is generated by anaerobic degradation, the breakdown of organic material in the absence of oxygen. In an effort to reduce anaerobic degradation and thus reduce the formation of hydrogen sulfide in the lagoon, the Charbert facility began operation of two aerators in the active lagoon on July 27, 2004. Measurable levels of dissolved oxygen were recorded in the lagoon water at sampling points closest to the two aerators beginning on July 28, 2004. By August 2, 2004, measurable dissolved oxygen levels were recorded throughout the lagoon.

Hydrogen sulfide levels recorded by the River Street monitor dropped dramatically after the installation of the aerators. During the period July 31 – August 12, 2004, the maximum hydrogen sulfide level recorded by that monitor was 9 ppb, the maximum one-hour average concentration was 5 ppb and the maximum 24-hour average was less than 1

ppb. These concentrations are consistent with background hydrogen sulfide levels in many areas of the State.

On August 12, 2004, the monitor was moved to 7 Myrtle Street at the request of neighbors. The concentrations recorded at that location between August 12 and September 21, 2004 were similar to those that had been recorded at the River Street location after the aerators began operating. On most days during that period, maximum concentrations remained at or below 4 ppb. The highest concentration recorded during that period was 10 ppb, the highest one-hour average 5 ppb and the highest 24-hour average 3 ppb.

Charbert reported to RI DEM that the motor failed on one of the two aerators in the active lagoon on September 19, 2001 and that the aerator was not again operational until 6:30 PM on September 21, 2004. Elevated concentrations of hydrogen sulfide were recorded during the early morning hours of the four days after the aerator again began operating, during periods when wind conditions were calm. RI DEM believes that, during the period that the aerator was not operating, anaerobic degradation again occurred in a section of the lagoon and the hydrogen sulfide generated by that process was released to the atmosphere when the aerator again began operating. The highest hydrogen sulfide concentration recorded during that four day period was 44 ppb, the highest one-hour average concentration was 36 ppb and the highest 24-hour concentration was 7 ppb.

After that four day period, hydrogen sulfide concentrations returned to levels consistent with background levels. The concentrations remained low for the remainder of the operation of the monitor, although concentrations briefly exceeded 10 ppb on four days between October 27 and November 1, 2004. The maximum concentration recorded during that period was 18 ppb, the maximum one-hour concentration was 7 ppb and the maximum one-hour concentration was 2 ppb. The facility reported that, because the active lagoon, Lagoon 1, was reaching its capacity, the level of that lagoon was reduced by approximately 15 inches on October 29, 2004 and by 10 inches on November 5, 2004 by pumping liquid into Lagoon 2. This occurrence may have caused the slightly elevated hydrogen sulfide levels recorded during this period.

The hydrogen sulfide monitor was removed from the Myrtle Street location on November 8, 2004 at the request of the resident. Neighbors report that the hydrogen sulfide odors in the neighborhood are generally less intense and less frequent in the winter than in the warmer months. If hydrogen sulfide odors again become a problem in the future, RI DEM may conduct further monitoring in the area.

Air Toxics Samples

Seven evacuated canister air samples were collected in the Alton neighborhood on six days between June and September 2004. Those samples were analyzed on a gas chromatograph/mass spectrometer by the Rhode Island Department of Health Air

Pollution Laboratory for volatile organic compounds (VOCs) using EPA Method TO-15. The results of those samples are displayed in Table II. The four September samples were taken by neighborhood residents at time that they smelled an odor.

The VOC levels in the samples were generally consistent with the background levels of these substances commonly seen in non-urban areas of the State. Concentrations of all substances measured on all days were substantially lower than noncancer benchmarks set by federal and state agencies. As in all areas of the State, concentrations of four substances – 1,3-butadiene, benzene, carbon tetrachloride and chloroform- were higher than the cancer benchmarks for those substances. Lifetime exposure to the cancer benchmark concentration is associated with an increased cancer risk of one in one million. Note that 1,3-butadiene and benzene are emitted by motor vehicles and carbon tetrachloride and chloroform are present in similar concentrations in background air throughout the country. All of these substances were present in the Charbert samples in concentrations that would be expected in a background non-urban site and are not likely to be associated with the facility.

Other information in the VOC results worthy of note includes:

- ◆ The levels of the gasoline additive methyl tert-butyl ether (MTBE) were generally higher in the Alton samples than at Alton Jones background rural site. The Alton concentrations of MTBE are similar to those seen in East Providence, a suburban area downwind of the Providence metropolitan area. The Alton levels are considerably lower than the health benchmark value and thus do not pose a health risk. Levels of other gasoline constituents, like benzene, in the Alton samples were similar to those at Alton Jones.
- ◆ Somewhat elevated levels of styrene were seen in the 1 September sample, which was taken on Poplar Avenue and somewhat elevated levels of ethyl acetate were seen in the 16 September sample, which was taken on Myrtle Avenue. These substances are present in consumer products and are not used at Charbert. The concentrations observed are substantially lower than the health benchmarks.
- ◆ Substantially elevated levels of propane and butane were seen in the 20 September sample, which was taken on Myrtle Avenue. Since the sample was taken on a porch that adjoins a kitchen area, the source of these substances was most likely the domestic use of natural gas or a similar fuel. These substances were not elevated in the other samples and are not considered air toxics.
- ◆ In the sample taken on 30 July on River Street, the laboratory identified significant peaks of three aldehyde compounds: butanal, hexanal and pentanal. Since the method used to sample for VOCs is not the appropriate method for quantifying aldehyde levels, RI DEM followed up by taking an aldehyde sample in the area. The sample was collected for a 24-hour period on 28 August on DNPH treated sorbent tubes and was analyzed by the New York Department of Environmental Conservation laboratory using EPA Method TO-11a. The results of that sample are attached as Table III. Concentrations of aldehydes in the Alton sample are similar to those taken concurrently in East Providence and are substantially below odor thresholds and

health benchmark levels. Significant peaks of these substances were not seen in any of the VOC samples collected in September.

Sampling has concluded in the Alton area, but RI DEM will resume sampling as necessary in the area if conditions change. For more information about sampling results, contact Barbara Morin at 222-4700, ext. 7012.

Figure I Alton Daily Maximum Hydrogen Sulfide Concentrations

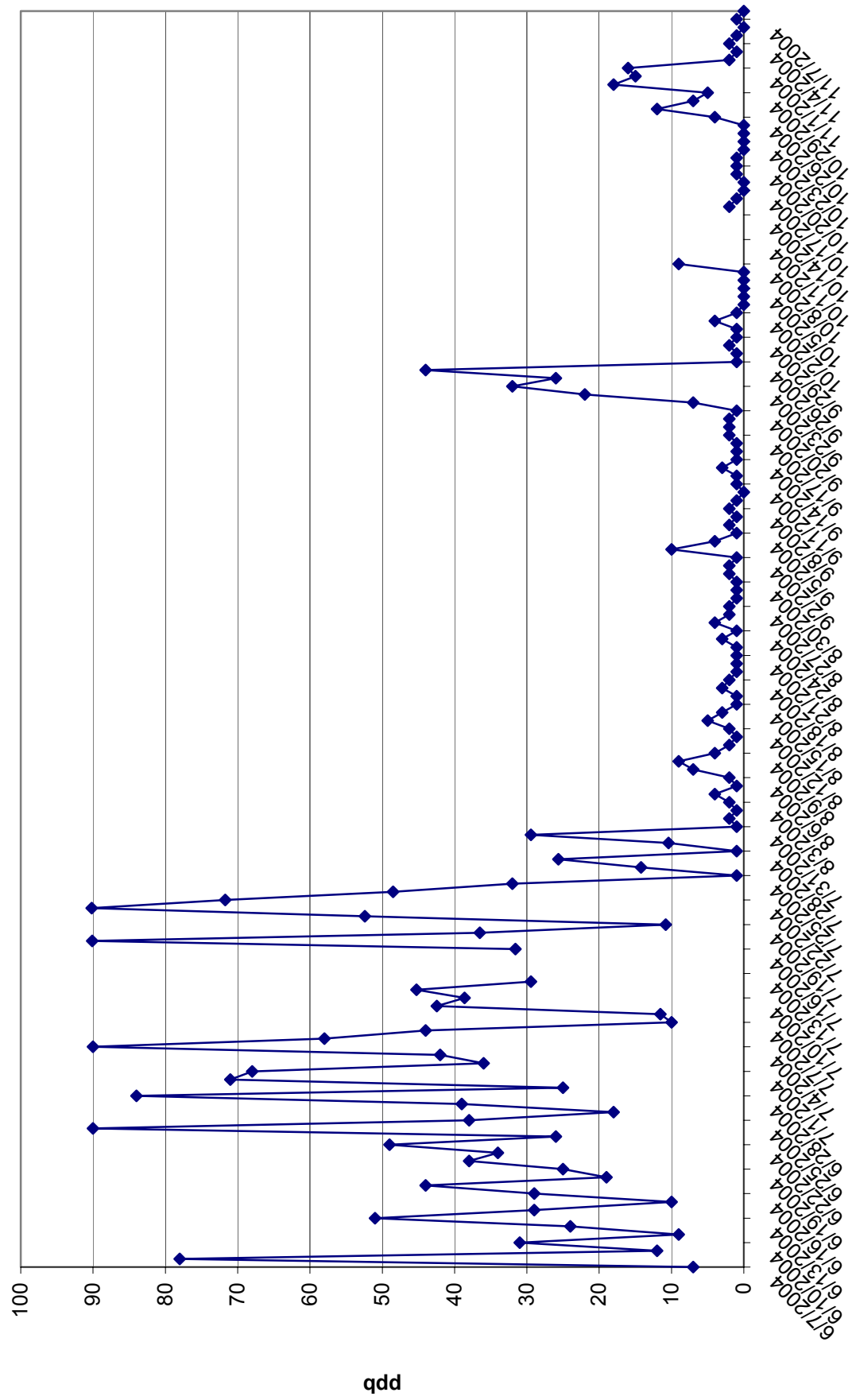


Table II Compound (VOC) Sample Results (in ppb)	South End River St. 06/24/04 5:45 AM	South End Myrtle St. 06/24/04 5:45 AM	16 River St. 07/30/04 1:30 PM	1 Poplar Av 09/01/04 7:40 PM	7 Myrtle Av 09/16/04 7:10 PM	7 Myrtle Av 09/20/04 9:40 PM	7 Myrtle Av 09/23/04 9:50 PM	Cancer Benchmark (1/million risk level)	Noncancer Benchmark
Ethylene	1.10	0.98	0.30	0.65	0.69	0.73	0.47		
Acetylene	0.94	2.42	0.32	0.56	0.70	0.66	0.51		
Ethane	2.06	2.12	2.56	1.23	1.25	1.32	1.39		
Propene	0.24	0.21	0.17	0.22	0.20	0.20	0.14		2000
Propane	3.71	3.27	0.96	0.98	1.05	12.84	1.74		
Chloromethane	0.73	0.67	0.59	0.60	0.67	0.50	0.49		40
isobutane	0.30	0.29	0.09	0.28	0.12	0.71	0.23		
1-butene	0.14	0.12	0.15	0.17	0.31	0.24	0.14		
1,3-butadiene	0.02	0.03	0.01	0.02	0.02	0.02	0.01	0.01	2
butane	0.56	0.52	0.13	0.71	0.28	24.45	0.37		
acetonitrile	0.04	0.00	0.14	0.14	0.07	0.10	0.06		40
acetone	9.36	0.85	6.71	5.06	1.78	1.63	1.36		10000
isopentane	1.17	1.02	0.04	1.70	0.80	0.93	1.04		
pentane	0.41	0.43	0.10	0.61	0.27	0.24	0.26		
carbon disulfide	0.02	0.01	0.005	0.009	0.02	0.05	0.01		200
Methyl-t-butyl-ether	0.58	0.63	0.05	1.31	0.89	0.33	0.75		800
2-methylpentane	0.33	0.29	0.04	0.49	0.32	0.24	0.32		
methyl ethyl ketone	0.39	0.04	0.38	0.38	0.13	0.13	0.06		300
3-methylpentane	0.22	0.17	0.01	0.24	0.17	0.13	0.16		
n-hexane	0.23	0.20	0.000	0.30	0.22	0.16	0.18		60
1,1,1-trichloroethane	0.02	0.02	0.003	0.02	0.02	0.02	0.02		200
benzene	0.22	0.19	0.05	0.23	0.17	0.16	0.15	0.04	9
carbon tetrachloride	0.12	0.09	0.09	0.09	0.08	0.09	0.09	0.01	6
n-heptane	0.07	0.07	0.00	0.13	0.09	0.07	0.07		
toluene	0.67	0.66	0.04	0.80	0.79	0.41	0.55		100
ethylbenzene	0.09	0.11	0.00	0.13	0.13	0.06	0.11		200
p & m xylenes	0.24	0.28	0.008	0.39	0.36	0.15	0.28		20
o-xylene	0.10	0.10	0.00	0.14	0.14	0.05	0.10		20
a-pinene	0.92	0.96	0.04	0.33	0.21	0.23	0.36		
1,2,4-trimethylbenzene	0.09	0.10	0.02	0.14	0.17	0.05	0.09		

Table II Compound (VOC) Sample Results (in ppb)	South End River St. 06/24/04 5:45 AM	South End Myrtle St. 06/24/04 5:45 AM	16 River St. 07/30/04 1:30 PM	1 Poplar Av 09/01/04 7:40 PM	7 Myrtle Av 09/16/04 7:10 PM	7 Myrtle Av 09/20/04 9:40 PM	7 Myrtle Av 09/23/04 9:50 PM	Cancer Benchmark (1/million risk level)	Noncancer Benchmark
trans-2-butene	0.05	0.04	0.01	0.07	0.03	0.04	0.04		
cis-2-butene	0.05	0.05	0.008	0.07	0.03	0.03	0.05		
1-pentene	0.05	0.05	0.05	0.08	0.15	0.06	0.05		
isoprene	0.34	0.55	4.59	3.92	1.55	0.58	0.42		
trans-2-pentene	0.07	0.10	0.00	0.14	0.06	0.04	0.07		
cis-2-pentene	0.03	0.05	0.00	0.06	0.03	0.02	0.04		
dichloromethane	0.11	0.09	0.05	0.06	0.06	0.06	0.03	0.6	100
2,2-dimethylbutane	0.04	0.05	0.00	0.05	0.02	0.04	0.04		
cyclopentane	0.04	0.04	0.00	0.08	0.04	0.04	0.05		
2,3-dimethylbutane	0.11	0.12	0.00	0.15	0.11	0.05	0.12		
chloroform	0.04	0.04	0.00	0.02	0.02	0.02	0.02	0.008	60
methylcyclopentane	0.14	0.12	0.00	0.20	0.15	0.09	0.13		
2,4-dimethylpentane	0.05	0.04	0.00	0.08	0.07	0.03	0.06		
cyclohexane	0.05	0.05	0.00	0.07	0.05	0.05	0.04		
2-methylhexane	0.10	0.09	0.00	0.11	0.09	0.07	0.06		
2,3-dimethylpentane	0.06	0.06	0.00	0.12	0.07	0.04	0.08		
3-methylhexane	0.11	0.10	0.00	0.15	0.12	0.08	0.09		
trichloroethylene	0.003	0.000	0.000	0.007	0.007	0.000	0.004	0.09	100
2,2,4-trimethylpentane	0.16	0.15	0.01	0.23	0.30	0.08	0.20		200
methylcyclohexane	0.06	0.05	0.00	0.05	0.05	0.04	0.04		
2,3,4-trimethylpentane	0.05	0.05	0.00	0.08	0.12	0.03	0.09		
2-methylheptane	0.03	0.02	0.00	0.05	0.04	0.03	0.03		
3-methylheptane	0.03	0.02	0.00	0.06	0.05	0.02	0.03		
n-octane	0.04	0.03	0.00	0.04	0.04	0.03	0.03		
tetrachloroethylene	0.04	0.03	0.00	0.03	0.02	0.01	0.01	0.03	5
styrene	0.01	0.02	0.00	0.10	0.01	0.02	0.03		200
n-nonane	0.03	0.02	0.00	0.02	0.02	0.02	0.02		
isopropylbenzene	0.009	0.009	0.00	0.01	0.009	0.006	0.008		
n-propylbenzene	0.02	0.03	0.00	0.03	0.04	0.02	0.03		
m-ethyltoluene	0.06	0.06	0.002	0.08	0.09	0.04	0.06		
p-ethyltoluene	0.04	0.04	0.00	0.04	0.04	0.02	0.03		

Table II	Alton Volatile Organic Compound (VOC) Sample Results (in ppb)	South End River St. 06/24/04 5:45 AM	South End Myrtle St. 06/24/04 5:45 AM	16 River St. 07/30/04 1:30 PM	1 Poplar Av 09/01/04 7:40 PM	7 Myrtle Av 09/16/04 7:10 PM	7 Myrtle Av 09/20/04 9:40 PM	7 Myrtle Av 09/23/04 9:50 PM	Cancer Benchmark (1/million risk level)	Noncancer Benchmark
	1,3,5-trimethylbenzene	0.02	0.02	0.00	0.03	0.04	0.01	0.03		
	o-ethyltoluene	0.03	0.03	0.00	0.03	0.04	0.02	0.02		
	n-decane	0.03	0.02	0.00	0.02	0.02	0.04	0.02		
	p-dichlorobenzene	0.01	0.008	0.00	0.006	0.004	0.003	0.003	0.02	100
	1,2,3-trimethylbenzene	0.02	0.02	0.00	0.03	0.04	0.01	0.03		
	m-diethylbenzene	0.004	0.000	0.00	0.005	0.000	0.000	0.003		
	p-diethylbenzene	0.01	0.02	0.00	0.02	0.04	0.05	0.02		
	n-undecane	0.03	0.03	0.02	0.02	0.05	0.04	0.03		
	dodecane	0.03	0.03	0.02	0.00	0.01	0.02	0.02		
	vinyl chloride	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.09	40
	acrylonitrile	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.005	0.9
	1,1-dichloroethene	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.005	50
	1,1-dichloroethane	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.16	
	ethyl acetate	0.000	0.000	0.00	0.02	0.24	0.000	0.000		890
	1,2-dichloroethane	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.01	100
	1,2-dichloropropane	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.02	0.9
	cis-1,3-dichloropropene	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.04	4
	trans-1,3-dichloropropene	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.04	4
	1,2-dibromoethane	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.00065	0.8
	chlorobenzene	0.000	0.000	0.00	0.000	0.000	0.000	0.000		200
	1,1,2,2-tetrachloroethane	0.000	0.000	0.00	0.000	0.000	0.000	0.000	0.003	400
	TNMOC* ppbC	156	134	103	152	127	238	102		

*Note: Total NonMethane Organic Compounds (TNMOC) is in units of parts per billion carbon (ppbC)

Table III Aldehyde Results August 28, 2004 Samples	Alton	E. Providence
	ppb	ppb
Target Substances		
n-butyraldehyde (butanal)	0.154	0.138
Valeraldehyde (pentanal)	0.074	0.042
Hexylaldehydye (hexanal)	0.077	0.113
Other Substances Identified		
formaldehyde	3.185	5.300
acetaldehyde	1.283	2.163
acetone	1.128	2.327
acrolein	0.031	0.048
propionaldehyde	0.188	0.246
crotonaldehyde	0.104	0.188
2-butanone	0.300	0.435
methacrolein	0.147	0.367
benzaldehyde	0.082	0.087
m-tolualdehyde	0.023	0.013